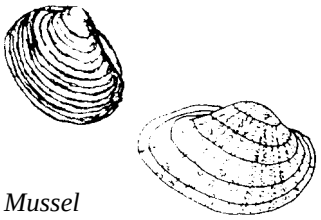
Taxonomic Key to Benthic Macroinvertebrates

The purpose of this taxonomic key is to assist volunteer monitors, who are not trained in taxonomy, with the identification of benthic macroinvertebrates found in Indiana. This key is a simplified version of more complex keys. The taxonomic level of this key is intended for use by citizen monitoring groups. When using this key please note that each couplet offers two or three options. Each couplet is numbered and the numbers in bold refer to the next couplet (the next set of numbers that you proceed to).

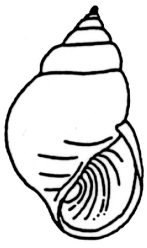
Please be aware that some macroinvertebrates may have missing body parts so you should look at more than one organism!

CHOOSE ONE:		**GO BELOW TO:**
(1)a	Has a shell(s)	**2**
(1)b	Has no shell	**5**
(2)a	Has a hinged double shell	**3**
(2)b	Has a single shell	**4**
(3)a	Adult under 2 inches long	**19**
(3)b	About 2-4 inches long	MUSSEL



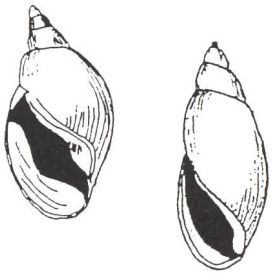
Mussel

(4)a	Right-handed opening	RIGHT-HANDED SNAIL



Right-Handed Snail

(4)b	Left-hand opening	LEFT-HANDED SNAIL

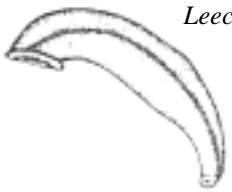


Left-Handed Snail

CHOOSE ONE:		GO BELOW TO:
(5)a	Has a segmented body or looks like a tiny tick	**6**
(5)b	Has an unsegmented body and has an "arrow shaped" head; 2 pigment spots (eyes)	PLANARIA

Planaria

(6)a	No obvious legs	**7**
(6)b	Obvious legs	**12**
(7)a	Has no obvious appendages (long, tubular body)	**8**
(7)b	Has some appendages (small tubes, tiny bumps, or feathery structures)	**9**
(8)a	Has a smooth body and suckers	LEECH

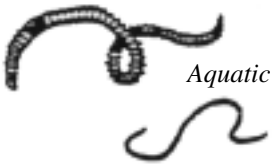


Leech

(8)b	Has a round body and a rat tail	RAT-TAILED MAGGOT

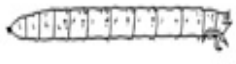
Rat-Tailed Maggot

(8)c	Has a rounded body	AQUATIC WORMS



Aquatic Worms

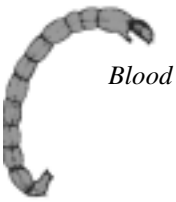
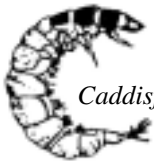
(9)a	Body black or brown; more than 1/3 inch long; plump and catepillar-like	CRANE FLY LARVA

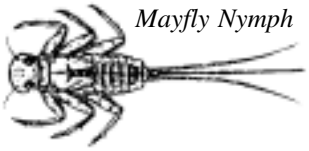


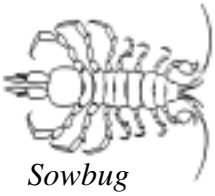
Crane Fly Larva

(9)b	Has a distinct head	**10**
(10)a	One end of body wider than other end; two tiny feather structures on smaller end	BLACK FLY LARVA

Black Fly Larva

CHOOSE ONE:		**GO BELOW TO:**
(10)b No difference in diameter along body		**11**
(11)a Bright red body	 *Blood Midge*	BLOOD MIDGES
(11)b Grey Body		OTHER MIDGES
(12)a Has four pairs of legs	 *Water Mite*	WATER MITE
(12)b Has three pairs of legs		**13**
(12)c Has many pairs of legs		**26**
(13)a Has no wings or short wing pads on back		**14**
(13)b Has two pairs of wings that cover the abdomen		**23**
(14)a Has a flat, round body with legs underneath (wings are not obvious)	 *Water Penny*	WATER PENNY BEETLE LARVA
(14)b Not flat, has long body with legs		**15**
(15)a Lives in a tube or a case or has two hooks in its last segment and is green with 3 plates on back behind head. (The "green caddisfly" builds a net & tube, but will be washed into the kick net as "free living")	 *Caddisfly Larva* 	CADDISLY LARVA
(15)b Free-living		**16**

CHOOSE ONE:		GO BELOW TO:
(16)a Abdomen possesses lateral filaments similar in size to legs		**21**
(16)b Abdomen does not have "leg-like" filaments (may have feathery "gills")		**17**
(17)a Always with only two tail appendages and no abdominal gills	 *Stonefly Nymph*	STONEFLY NYMPH
(17)b Usually has three tail appendages, and with no lateral gills on abdominal segments		**18**
(17)c Tail has no appendages		**25**
(18)a Has long, bristle-like tail appendages, sometimes 2 or 3	*Mayfly Nymph* 	MAYFLY NYMPH
(18)b Lower lip formed into extensible scoop-like structure and has leaf-like tail appendages	 *Damselfly Nymph*	DAMSELFLY NYMPH
(19)a Small rounded shell (< 2 inches)		**20**
(19)b Small triangular shell with alternating cream and dark brown bands	 *Zebra Mussel*	ZEBRA MUSSEL (EXOTIC)
(20)a Numerous very fine concentric rows of elevated lines, white or cream colored, with smooth lateral teeth (ridge lines on inside near point)	 *Fingernail Clam*	FINGERNAIL CLAM
(20)b Numerous concentric elevated ridges, yellowish brown to black shell with serrated lateral teeth	 *Asiatic Clam*	ASIATIC CLAM (EXOTIC)

CHOOSE ONE:		GO BELOW TO:
(21)a Head narrower than widest body segments	 *Beetle larva*	BEETLE LARVA
(21)b Head as wide or wider than other body segments		**22**
(22)a Abdomen with single long filament at end	 *Alderfly*	ALDERFLY
(22)b Abdomen ending with a pair of tiny hooked legs, large head with pincer-like jaws	 *Dobsonfly Larva*	DOBSONFLY OR FISHFLY
(23)a Oval shaped body, legs with feathery swimming hairs	 *Water bug*	ADULT WATER BUGS AND WATER BEETLES
(23)b All legs smooth, without hairs, crawling	 *Riffle Beetle Adult*	RIFFLE BEETLE ADULT
(25)a Lower lip formed into scoop like structure	 *Dragonfly Nymph*	DRAGONFLY NYMPH
(25)b Looks like a tiny millipede	 *Riffle Beetle Larva*	RIFFLE BEETLE LARVA
(26)a Flattened top to bottom, crawling looks like "roly-poly" or a "pill bug"	 *Sowbug*	SOWBUG
(26)b Flattened side to side, swimming looks like tiny shrimp	 *Scud or Side-swimmer*	SCUD

Key to Macroinvertebrate Life in the River

(Sizes of illustrations are not proportional.)

Shells

Single Shell

spiral, opening on left

Pouch Snail

spiral, opening on right

Gilled Snail

coiled

Orb Snail

conical

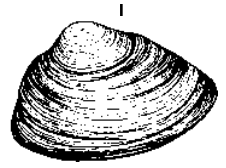
Limpet

Double Shell

small, whitish, tan or brown

Pill or Fingernail Clam

large, 2 to 8 inches, dark-colored

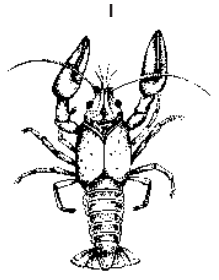


Freshwater Mussel

Legs

10+ Legs

lobster-like



Crayfish

shrimp-like, swims on side

Scud or Amphipod

walks on bottom

Aquatic Sowbug or Isopod

Four Pairs of Legs

tiny, often brightly colored

Water Mite

runs on top of water

Fishing Spider

No Legs

With Tentacles, Brushes or "Tails"

long breathing tube

Rat tailed Maggot Larva

two fringed "tails"

Water Snipe Fly Larva

smooth, "stiff," small head

Horse Fly Larva

large, grey with tentacles

Crane Fly Larva

white or grey with tentacles

Crane Fly Larva

big "head," active

Midge Pupa

black, attaches to hard surfaces

Black Fly Larva

Worm-Like

Suckers, expands and contracts, body segmented

Leech

reddish brown, segmented body

Tubifex Worm

glides along bottom, body not segmented

Flatworm or Planaria

tan to brown, long

Horsehair Worm

body with bristles, no suckers

Bristle Worm

distinct head, red, green or tan, twists

Midge Larva

small, hair-like, swims in "S" shape

Nematode or Threadworm

Microscopic

apostrophe-shaped

Cyclops or Copepod

round

Seed and Clam Shrimp

swims with a jerk, using antennas

Water Flea or Daphnia

Three Pairs of Legs

Wings

Beetle-Like, Wings Hard

small, crawls on bottom

Riffle Beetle

swims moving hind legs alternating

Water Scavenger Beetle

back legs move at same time

Predaceous Diving Beetle

swims on surface

Whirligig Beetle

"Crawls" through water, spotted

Crawling Water Beetle

Leathery Wings

tan, lives on surface

Marsh Treader

dark, lives on surface

Water Strider

grasping front legs, up to three inches

Giant Water Bug

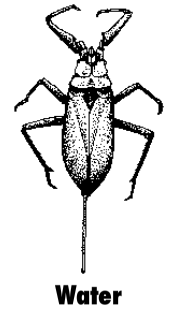
swims on back, back white

Backswimmer

swims right-side-up, back black

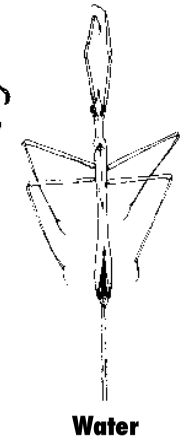
Water Boatman

long breathing tube, grasping front legs



Water Scorpion 'Nepa'

long, stick-like



Water Scorpion 'Ranatra'

No Wings

No Obvious "Tails"

brown, leatherlike, six legs, usually "C"-shaped

Riffle Beetle Larva

six legs and prolegs on abdomen

Pyralid Caterpillar

suction cup-like

Water Penny

large body, hinged mouth

Dragonfly Larva

green, tan, orange or white body

Caddisfly Larva

lives in stone case

Caddisfly Larva

lives in stick house

Caddisfly Larva

One or Two "Tails"

dark head, green or tan body, two brush-like tails

Caddisfly Larva

small, "spines" on side

Alderfly Larva

large mouth parts, "spines" on side

Dobsonfly Larva

"tails" long and stiff, long antennas

Stonefly Larva

flat gills on abdomen

Mayfly Larva

hangs from surface, large mouth parts

Predaceous Diving Beetle Larva

Three "Tails"

long "tails," gills on abdomen

Mayfly Larva

long "tails," gills on abdomen

Mayfly Larva

large legs, feathery gills

Mayfly Larva

plate-like "tails," no gills on abdomen

Damselfly Larva

side view of "tails"

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How to Complete the Biological Monitoring Data Sheet

The first portion of the Biological Monitoring Data Sheet is the information section. For instructions on how to complete this section, see pages 108-111 in Chapter 7 Data Reporting.

Sampling Procedures

Equipment: Check one or both of the nets used to collect macroinvertebrate sample.
Habitat: Check each type of habitat sampled during this survey.

Pollution Tolerance Index

The macroinvertebrate index is divided into Pollution Tolerance Groups (PT Group) 1,2,3 and 4. These PT groups represent the different levels of pollution tolerance. The higher the group number, the higher the pollution tolerance level. Record the number of macroinvertebrates you find here.

PT GROUP 1 *Intolerant*		**PT GROUP 2** *Moderately Intolerant*		**PT GROUP 3** *Fairly Tolerant*		**PT GROUP 4** *Very Tolerant*	
Stonefly Nymph	6	Damselfly Nymph		Midge Larvae	>100	Left-Handed Snail	1
Mayfly Nymph	5	Dragonfly Nymph	15	Black Fly Larvae		Aquatic Worms	25
Caddis Fly Larvae	10	Sowbug		Planaria	16	Blood Midge	
Dobsonfly Larvae		Scud		Leech		Rat-tailed Maggot	
Riffle Beetle		Crane Fly Larvae					
Water Penny	30	Clams/Mussels					
Right-Handed Snail		Crayfish	2				

The next row is the # of Taxa. Insects that have the same body shape all belong to the same taxa (see the back of your PTI macroinvertebrate data sheet for general body shape/taxa). To find the total number of taxa for each PT Group you need to add the number of types of organisms. It is possible to have a particular PT group without any numbers, therefore it will score a zero.

Do not make the mistake of adding the numbers of organisms together.

# of TAXA 4	**# of TAXA** 2	**# of TAXA** 2	**# of TAXA** 2

The next row is the group scores. Multiply each # of taxa by its weighting factor.

# of TAXA 4	**# of TAXA** 2	**# of TAXA** 2	**# of TAXA** 2
Weighting Factors: **(x 4)** 16	**(x 3)** 6	**(x 2)** 4	**(x 1)** 2

Note: The Volunteer Stream Monitoring Internet Database (described in Chapter 7) will perform these calculations for you when you submit data.

Then total all of the group scores to get the POLLUTION TOLERANCE INDEX RATING.

# of TAXA	4	# of TAXA	2	# of TAXA	2	# of TAXA	2
(x 4)	16	(x 3)	6	(x 2)	4	(x 1)	2

23 +	Excellent
17 - 22	Good
11 - 16	Fair
10 or Less	Poor

POLLUTION TOLERANCE INDEX RATING
(Add the final index values for each group.)

28

Other Biological Indicators

Check the appropriate box if you find native mussels, zebra mussels, rusty crayfish or submerged aquatic plants at your site. Estimate the percentage of rocks or the stream bottom covered by algae at your site. Write your Diversity Index score if you perform the procedures described on pages 95-96.

Other Biological Indicators

☐ Native Mussels ☐ Zebra Mussels ☐ Rusty Crayfish ☑ Aquatic Plants 25 % Algae Cover 0.75 Diversity Index

Example of a complete Pollution Tolerance Index:

POLLUTION TOLERANCE INDEX (PTI)

PT GROUP 1 *Intolerant*		PT GROUP 2 *Moderately Intolerant*		PT GROUP 3 *Fairly Tolerant*		PT GROUP 4 *Very Tolerant*	
Stonefly Nymph	6	Damselfly Nymph		Midge Larvae	>100	Left-Handed Snail	1
Mayfly Nymph	5	Dragonfly Nymph	15	Black Fly Larvae		Aquatic Worms	25
Caddis Fly Larvae	10	Sowbug		Planaria	16	Blood Midge	
Dobsonfly Larvae		Scud		Leech		Rat-tailed Maggot	
Riffle Beetle		Crane Fly Larvae					
Water Penny	30	Clams/Mussels					
Right-Handed Snail		Crayfish	2				
# of TAXA	4	**# of TAXA**	2	**# of TAXA**	2	**# of TAXA**	2
Weighting Factors: (x 4)	16	(x 3)	6	(x 2)	4	(x 1)	2

23 or More	Excellent
17 - 22	Good
11 - 16	Fair
10 or Less	Poor

POLLUTION TOLERANCE INDEX RATING
(Add the final index values for each group.)

28

BIOLOGICAL MONITORING DATA SHEET

Date ____/____/____ (MM DD YY) Begin Time _____:_____ (am/pm) # Adults _____

End Time _____:_____ (am/pm) # Students _____

Certified Monitors' Names_____ Volunteer ID_____

Organization Name _____

Watershed Name _____ Watershed # __ __ __ __ __ __ __ __

Stream/River Name _____ Site ID _____

(Please do not abbreviate.) (Above ID numbers are required.)

Check Methods Used

- ☐ Kick Seine Net (3 times)
- ☐ D-Net (20 jabs or scoops)

Check Habitats Sampled

- ☐ Riffles
- ☐ Leaf Packs
- ☐ Undercut Banks
- ☐ Snags/Vegetation
- ☐ Sediment
- ☐ Other

POLLUTION TOLERANCE INDEX (PTI)

PT GROUP 1 *Intolerant*		PT GROUP 2 *Moderately Intolerant*		PT GROUP 3 *Fairly Tolerant*		PT GROUP 4 *Very Tolerant*	
Stonefly Nymph	_____	Damselfly Nymph	_____	Midges	_____	Left-Handed Snail	_____
Mayfly Nymph	_____	Dragonfly Nymph	_____	Black Fly Larvae	_____	Aquatic Worms	_____
Caddis Fly Larvae	_____	Sowbug	_____	Planaria	_____	Blood Midge	_____
Dobsonfly Larvae	_____	Scud	_____	Leech	_____	Rat-tailed Maggot	_____
Riffle Beetle	_____	Crane Fly Larvae	_____				
Water Penny	_____	Clams/Mussels	_____				
Right-Handed Snail	_____	Crayfish	_____				
# Of TAXA	_____	**# Of TAXA**	_____	**# Of TAXA**	_____	**# Of TAXA**	_____
Weighting Factors: **(x 4)**	_____	**(x 3)**	_____	**(x 2)**	_____	**(x 1)**	_____

23 or More	**Excellent**
17 - 22	**Good**
11 - 16	**Fair**
10 or Less	**Poor**

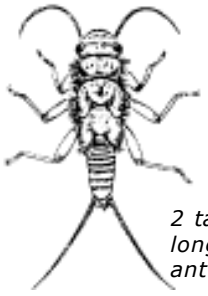
POLLUTION TOLERANCE INDEX RATING
(Add the final index values for each group.) ☐

Other Biological Indicators

- ☐ Native Mussels
- ☐ Zebra Mussels
- ☐ Rusty Crayfish
- ☐ Aquatic Plants
- _____ % Algae Cover
- _____ Diversity Index

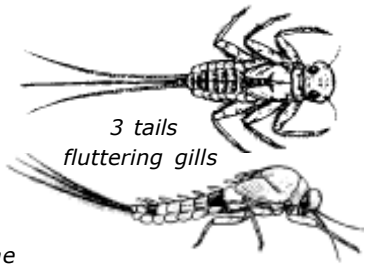
Macroinvertebrate Identification Key

GROUP 1 – Very Intolerant of Pollution



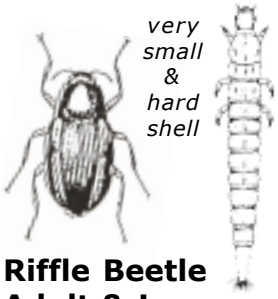
2 tails long antennae

Stonefly Nymph



3 tails fluttering gills

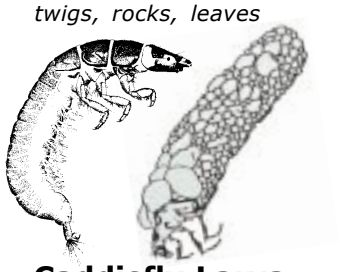
Mayfly Nymph



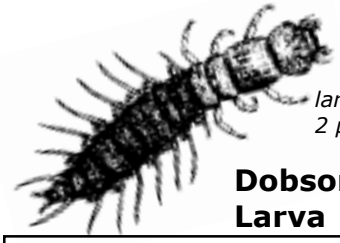
very small & hard shell

Riffle Beetle Adult & Larva

makes a case from twigs, rocks, leaves



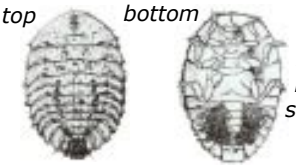
Caddisfly Larva



large head & 2 pinchers

Dobsonfly Larva

top *bottom*



looks like a suction cup

Water Penny Larva

Right-Handed Snail

must be alive to count

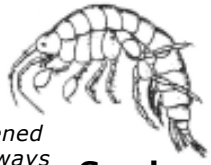
GROUP 2 – Moderately Intolerant of Pollution

3 paddle-like (feathery) tails

Damselfly Nymph

Dragonfly Nymph

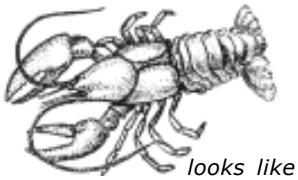
no tails large eyes



flattened side-ways & swims on side

Scud

Crayfish

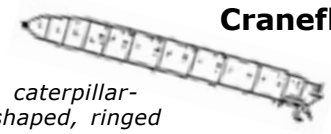


looks like a mini-lobster

Sowbug

flattened top to bottom (looks like a pill bug)

Cranefly



caterpillar-shaped, ringed

Clam/Mussel

must be alive to count

GROUP 3 – Fairly Tolerant of Pollution

Midge Larva

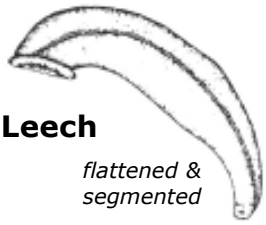
small, but visible head intense wiggler

Planaria

2 eye spots & very small

one end is swollen

Black Fly Larva

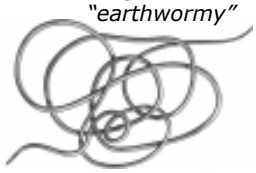


Leech

flattened & segmented

GROUP 4 – Very Tolerant of Pollution

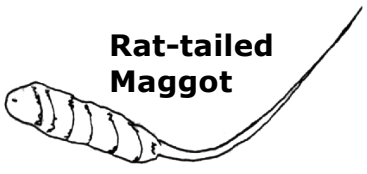
segmented "earthwormy"



Aquatic Worms

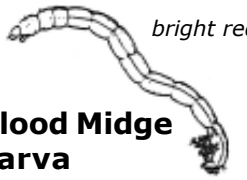
must be alive to count

Left-Handed Snail



Rat-tailed Maggot

bright red



Blood Midge Larva

Other Macroinvertebrate Indices

Once you have identified the macroinvertebrates in your river or stream samples and noted the number of each taxa, the data can easily be applied to more than one index. The metrics shown below were developed for the Virginia Save Our Streams program through an extensive research project by Sarah Engel and J. Reese Voshell at Virginia Tech. These examples are provided for Riverwatch volunteers purely for educational use. They provide an example of additional information that can be obtained from samples properly collected and counted for the Pollution Tolerance Index (PTI).

Individual Macroinvertebrate Metrics

Metric	Number Counted		Total # of Organisms in the Sample		Final Percent
A) Mayflies + Stoneflies + Most Caddisflies	16	Divide by	210	Multiply by 100	7.62
B) Common Netspinner Caddisflies	5	Divide by	210	Multiply by 100	2.38
C) Lunged Snails - Orb + Left-handed + Limpets	1	Divide by	210	Multiply by 100	0.48
D) Riffle Beetles + Water Pennies	30	Divide by	210	Multiply by 100	14.29

Since the final multimetric index rating values or "scores" were based on ecological conditions in Virginia streams, they do not apply in Indiana. The final metric is only valid for shallow, rocky-bottom streams in the mid-Atlantic region of the U.S. However, we hope to someday complete the research to develop a multimetric index for use in Indiana. If you want to "try out" this index with your data, your sample must contain at least 200 organisms for these metrics to be valid.

- Metric A scores better when higher, since these are Group 1 organisms.
- Metric B scores better when lower, since net spinners are more tolerant of pollution.
- Metric C scores better when lower, since these are Group 4 organisms.
- Metric D scores better when higher, since these are in Group 1.
- Metrics E & F score better when lower, since these are more tolerant organisms (mostly Group 3 & 4).

E) % Tolerant Organisms

Taxon	Number
Damselflies	
Dragonflies	15
Sowbugs	
Scuds	
Clams	
All Midges	>100
Black Flies	
Planaria	16
Leeches	
Lunged Snails	1
Aquatic Worms	25
Total Tolerant	157
Total Tolerant divided by the total number of organisms in the sample	210
Multiply by 100 (E)	74.76

F) % Non-Insects

Taxon	Number
Right-handed snails	
Sowbugs	
Scuds	
Clams	
Crayfish	2
Planaria	16
Leeches	
Lunged Snails	1
Aquatic Worms	25
Total Non-Insects	157
Total Non-Insects divided by the total number of organisms in the sample	210
Multiply by 100 (F)	20.95

Virginia Save Our Streams Multimetric Index

Metric	Your Metric Result	2	1	0
A) Mayflies + Stoneflies + Most Caddisflies	7.62	Greater than 32.2	16.1-32.2	Less than 16.1 ✓
B) Common Netspinner Caddisflies	2.38	Less than 19.7	19.7-34.5	Greater than 34.5 ✓
C) Lunged Snails	0.48	Less than 0.3	✓ 0.3-1.5	Greater than 1.5
D) Riffle Beetles + Water Pennies	14.29	Greater than ✓ 6.4	3.2-6.4	Less than 3.2
E) % Tolerant	74.76	Less than 46.7	46.7-61.5	Greater than 61.5 ✓
F) % Non-Insects	20.95	Less than 5.4	5.4-20.8	Greater than 20.8 ✓
subtotals:		Total # of 2s: 1 Multiply by 2: 2	Total # of 1s: 1 Multiply by 1: 1	Total # of 0s: 4 Multiply by 0: 0
Add the 3 subtotals to get the Final Multimetric Index Score:				3

☐ Acceptable Ecological Condition (7-12)
☑ Unacceptable Ecological Condition (0-6)

(Information on this page modified from Engel and Voshell, 2002.)

Virginia Save Our Streams Multimetric Index

Disclaimer: These indices can be used by Hoosier Riverwatch volunteers for educational use and practice in determining a multimetric biotic index. The rating scale used in the final multimetric index was developed for Virginia streams and is not valid for use in determining overall stream health in Indiana.

Individual Macroinvertebrate Metrics

Metric	Number Counted		Total # of Organisms in the Sample		Final Percent
A) Mayflies + Stoneflies + Most Caddisflies		Divide by		Multiply by 100	
B) Common Netspinner Caddisflies		Divide by		Multiply by 100	
C) Lunged Snails - Orb + Left-handed + Limpets		Divide by		Multiply by 100	
D) Riffle Beetles + Water Pennies		Divide by		Multiply by 100	

E) % Tolerant Organisms

Taxon	Number
Damselflies	
Dragonflies	
Sowbugs	
Scuds	
Clams	
All Midges	
Black Flies	
Planaria	
Leeches	
Lunged Snails	
Aquatic Worms	
Total Tolerant	
Total Tolerant divided by the total number of organisms in the sample	
Multiply by 100 (E)	

F) % Non-Insects

Taxon	Number
Right-handed snails	
Sowbugs	
Scuds	
Clams	
Crayfish	
Planaria	
Leeches	
Lunged Snails	
Aquatic Worms	
Total Non-Insects	
Total Non-Insects divided by the total number of organisms in the sample	
Multiply by 100 (F)	

Virginia Save Our Streams Multimetric Index

Metric	Your Metric Result	2	1	0
A) Mayflies + Stoneflies + Most Caddisflies		Greater than 32.2	16.1-32.2	Less than 16.1
B) Common Netspinner Caddisflies		Less than 19.7	19.7-34.5	Greater than 34.5
C) Lunged Snails		Less than 0.3	0.3-1.5	Greater than 1.5
D) Riffle Beetles + Water Pennies		Greater than 6.4	3.2-6.4	Less than 3.2
E) % Tolerant		Less than 46.7	46.7-61.5	Greater than 61.5
F) % Non-Insects		Less than 5.4	5.4-20.8	Greater than 20.8
subtotals:		Total # of 2s:	Total # of 1s:	Total # of 0s:
		Multiply by 2:	Multiply by 1:	Multiply by 0:

Add the 3 subtotals to get the Final Multimetric Index Score: _____

- ❒ Acceptable Ecological Condition (7-12)
- ❒ Unacceptable Ecological Condition (0-6)

Macroinvertebrate Diversity Index

The Diversity Index does not require benthic macroinvertebrate identification. This index measures stream water quality by distinguishing organisms by color, size and shape. The only distinction is made between the number of runs, and the number of different types (taxa) of organisms.

1. Collect macroinvertebrates using the Kick Seine or Dip Net sampling procedures and place them in a jar with water or a preservative and randomize them by swirling.

2. Make a grid of 4-6 cm squares on the bottom of a white tray.

3. Pour the sample from the jar into the white tray, spreading the macroinvertebrates evenly over the tray.

4. Randomly select a starting grid and begin picking out organisms in a random sequence. Pick out all the specimens from one square before moving to the next square. If you picked all of the specimens from one square and there were less than 50 organisms in the square, move to the next square and pick all of the organisms from that square to add to the first. You must have at least 50 organisms to complete the test procedures.

5. Place the selected organisms in another tray and compare them two at a time. You will be determining if the next insect is like or different from the previous organism. To complete the "***Organism***" row, place an "X" in the box if the organism you are comparing is like the previous organism and a "O" if it is different from the previous organism. Fill in the X and O boxes until you have compared 50 organisms.

6. To complete the "***Run***" row, record a number each time a change from "X" to "O", or "O" to "X" occurs. An example is shown below. **Note: Always place an "X "in the first box for your first organism, and always begin with the number one for your first run.**

Organism	X	O	X	O	O	X	O	X	X
Run	1	2	3	4		5	6	7	

Calculations

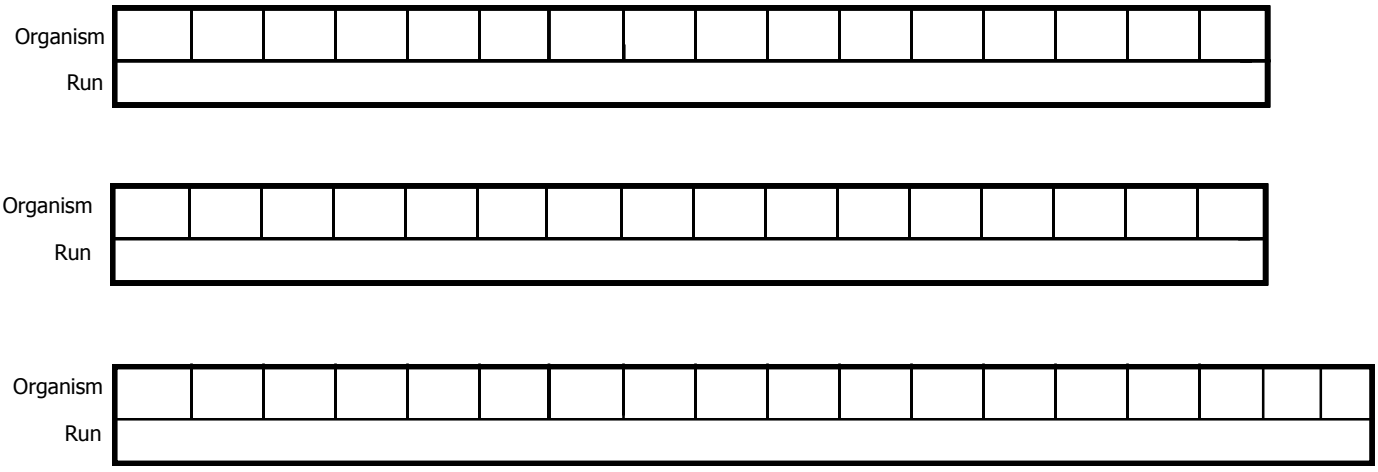
Determine the total number of runs and the total number of organisms (usually 50). Divide the number of runs by the number of organisms to determine the Diversity Index. *(Note: The diversity index is the same as the Sequential Comparison Index printed in the first edition of this manual).*

Diversity Index = Number of runs / Number of organisms = 7 / 9 = .78 = Good

Diversity Index Results

0.0 - 0.3	Poor
0.3 - 0.6	Fair
0.6 - 1.0	Good

Sample 1



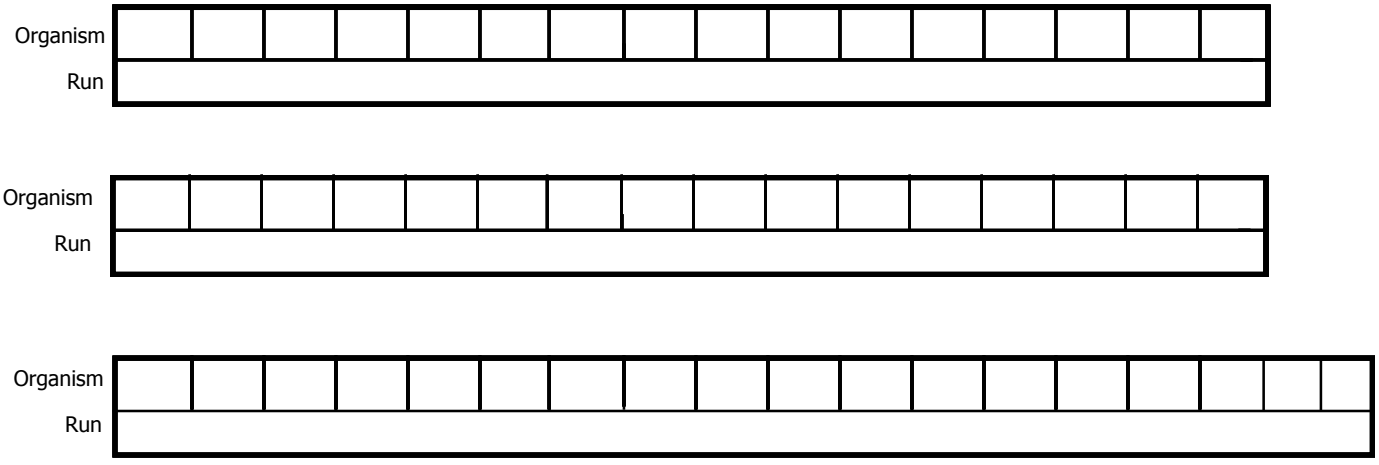
Total Number of Runs: _____

Total Number of Organisms: _____

Divide __# Runs__ **to get Diversity Index Results:** _____
 # Organisms

Diversity Index Results	
0.0 - 0.3	Poor
0.3 - 0.6	Fair
0.6 - 1.0	Good

Sample 2



Total Number of Runs: _____

Total Number of Organisms: _____

Divide __# Runs__ **to get Diversity Index Results:** _____
 # Organisms

Diversity Index Results	
0.0 - 0.3	Poor
0.3 - 0.6	Fair
0.6 - 1.0	Good